


Overcoming Obstacles to Population Risk Assessment



Wayne R. Munns, Jr.

Office of Research and Development

National Health and Environmental Effects Laboratory

Atlantic Ecology Division

Overview

- General considerations *re* population risk assessment
- Approaches to overcome obstacles
- Identifying appropriate assessment endpoints

Assessing Risks to Populations

“Ecological effects of most concern are those that can impact populations...”
(Ecological Risk Assessment Guidance for Superfund, 1997)

yet,

- Few site-specific population risk assessments are actually conducted
- Perceived obstacles and methodological uncertainty remain

Some Obstacles

- Definition of “population”
- Level of protection afforded
- Technical challenges
- Relationships to legal mandates

What Is a Population?

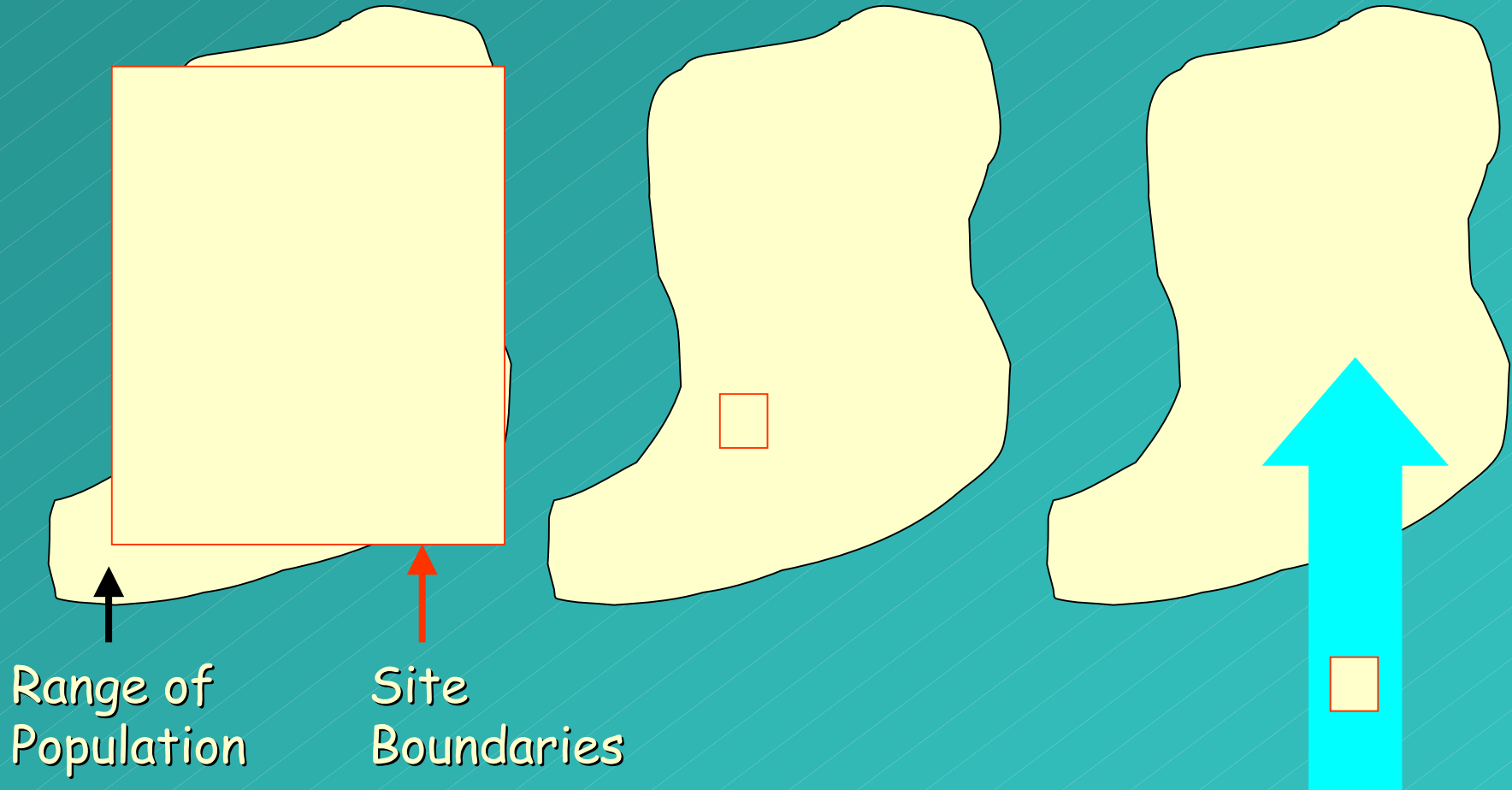
- Ecological definitions
 - bounded in space
 - bounded genetically
 - self-regulating
- Operational definitions
- Relevance to management goals
 - effects on site population, or
 - effects of site on population?

For Site-Specific Assessments

Case 1

Case 2

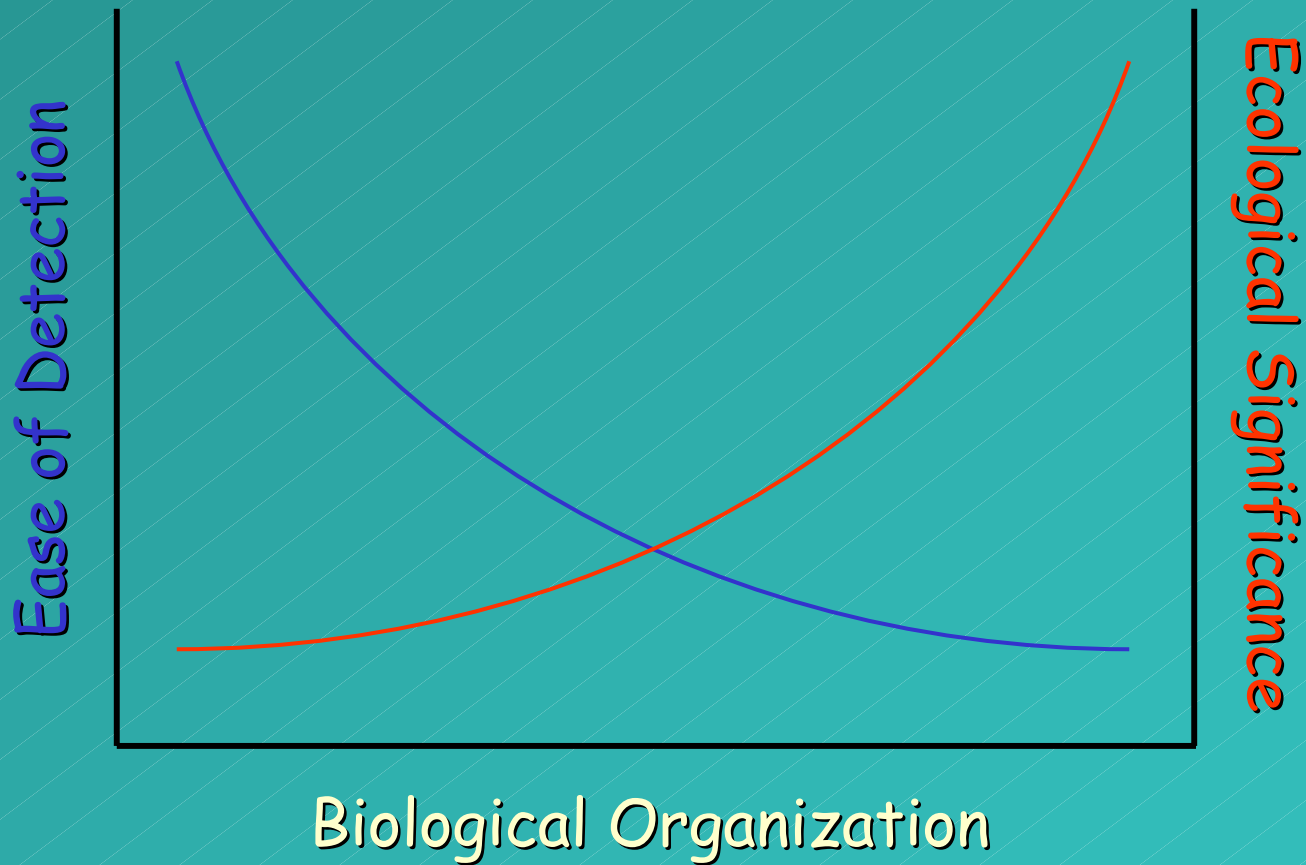
Case 3



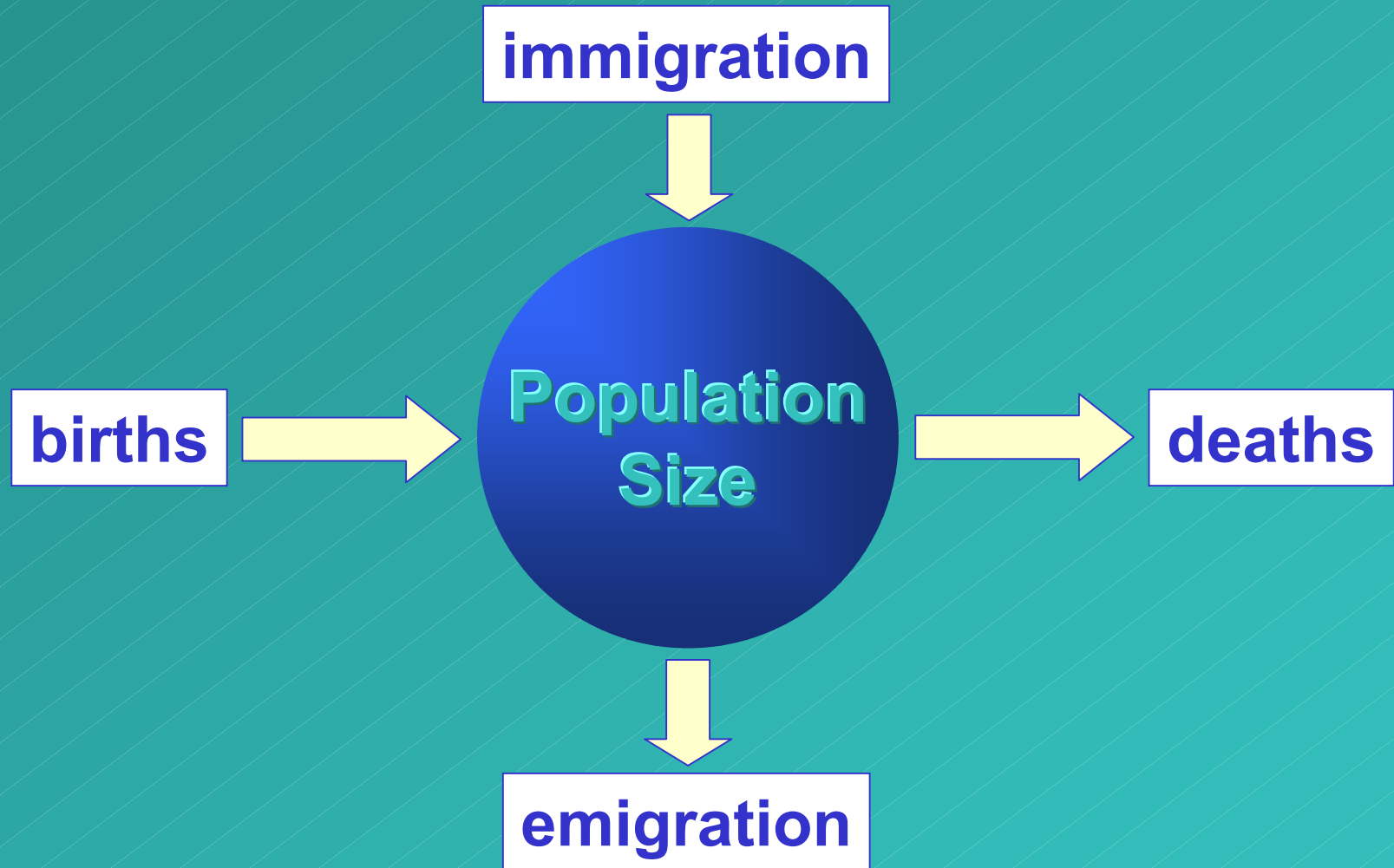
Level of Protection - When are Population Endpoints Appropriate?

- To meet intent of law (*e.g.* CWA) or when required by regulation
- When population viability is the issue
- In conjunction with other endpoints
- In effects-driven, stressor-driven & resource-driven assessments
- When data, methods & models are available

What Are We Protecting?



Assessing Population Effects



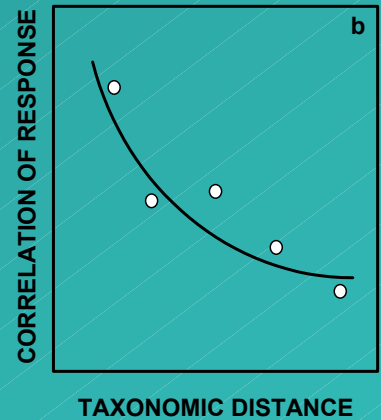
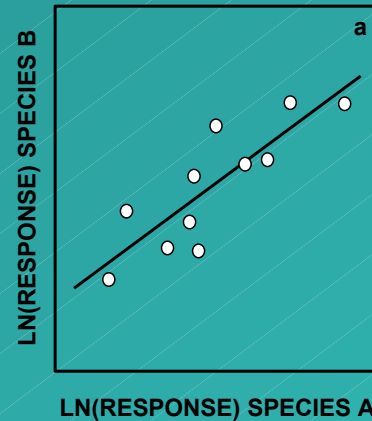
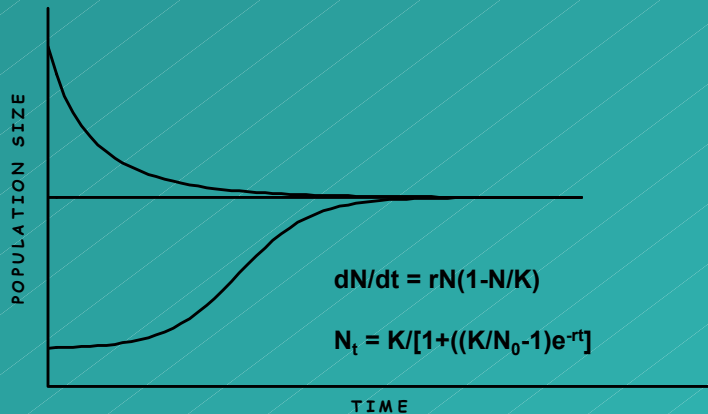
Population-Level Endpoints

A characteristic of a self-regulated population, not of individuals in the population

- Abundance
 - size, density
 - equilibrium size
 - production, yield
 - spatial distribution
- Structure
 - genetic diversity
 - tolerance distribution
 - sex ratio
- Growth rate
- Persistence
 - probability of & time to extinction (quasi-extinction)
 - minimum viable population
 - stability
 - recovery time

Quantification Approaches

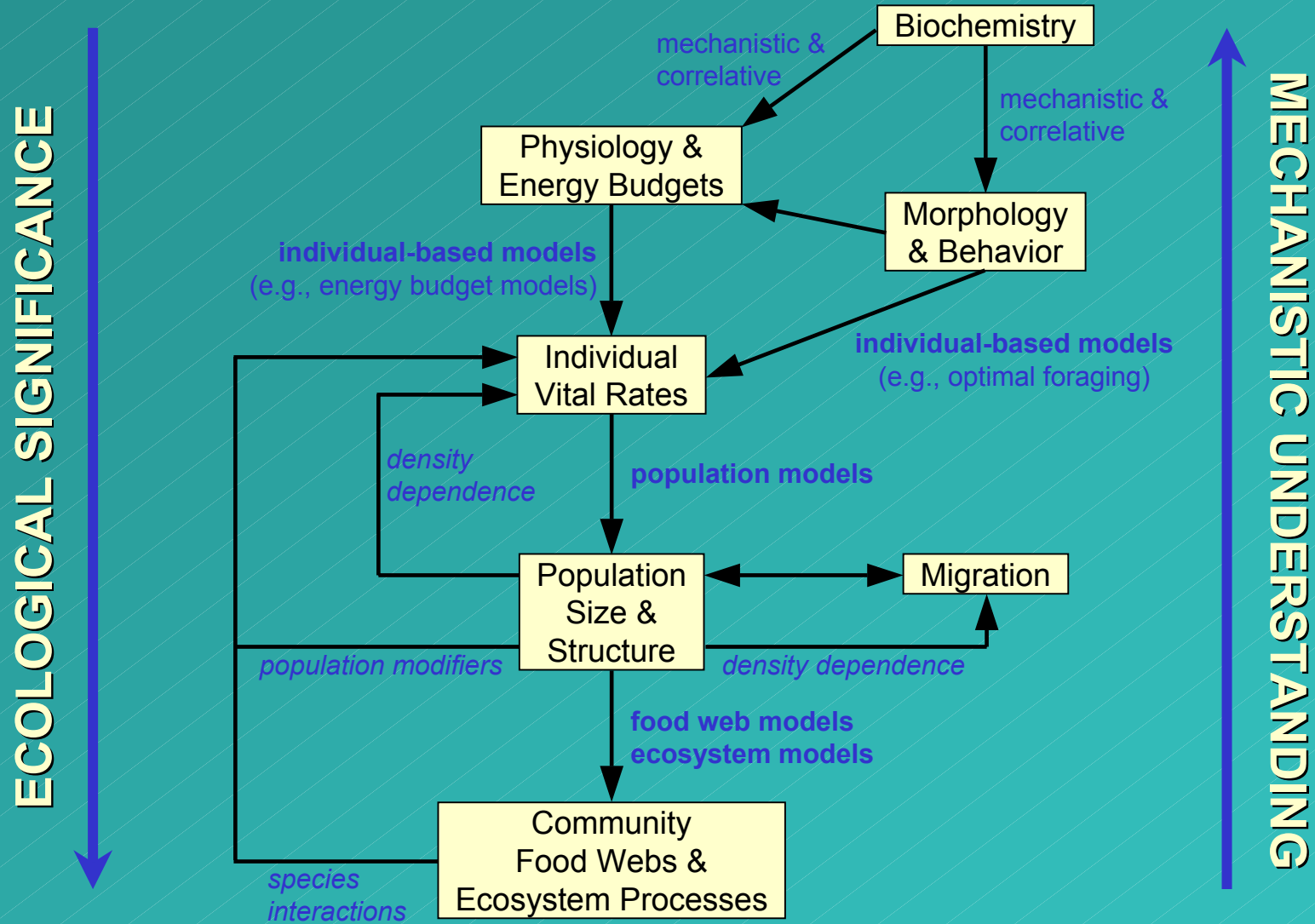
Empirical Extrapolation



Mechanistic Extrapolation

Direct Measurement

Extrapolatable Relationships

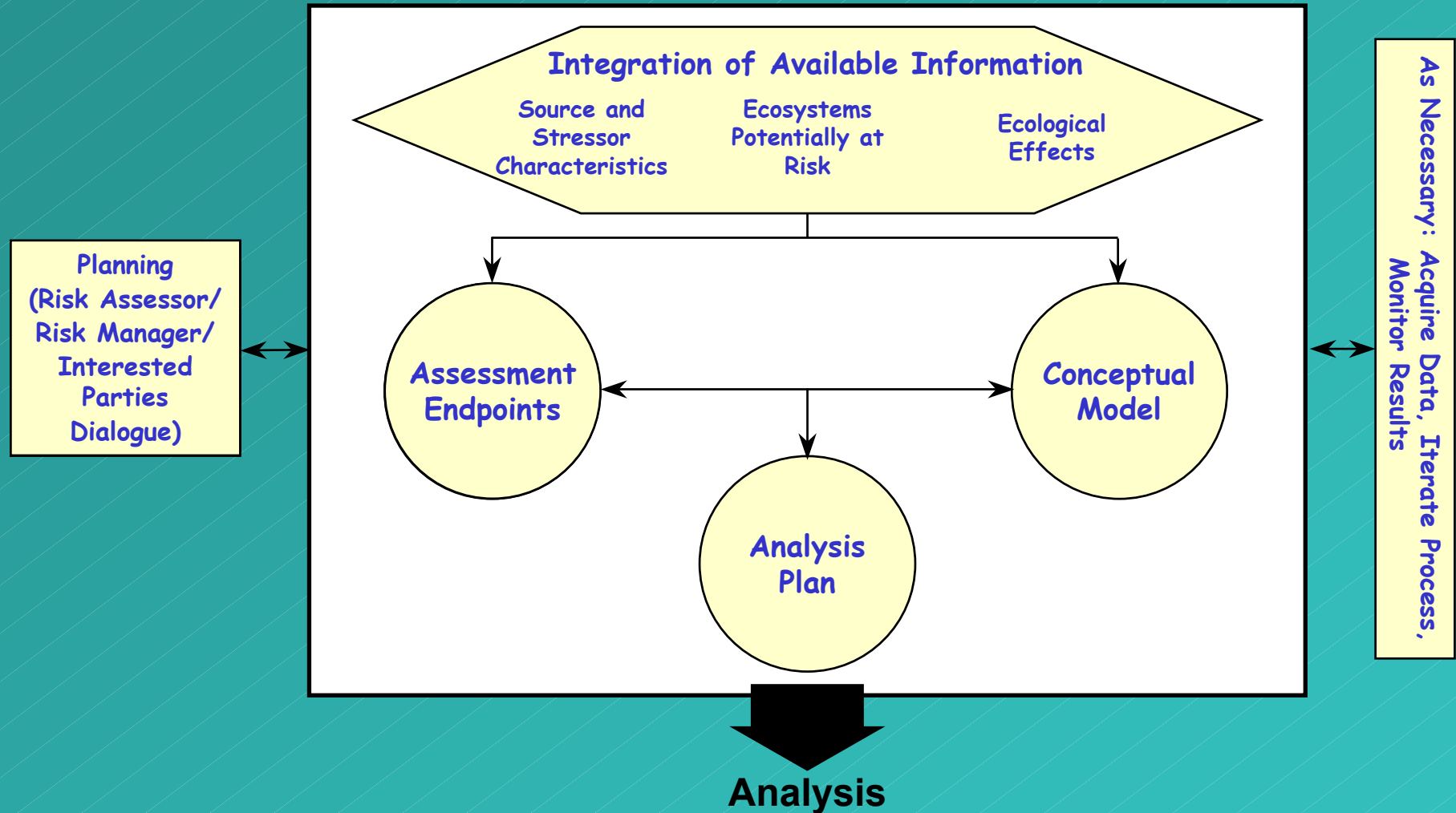


Maltby et al. 2001

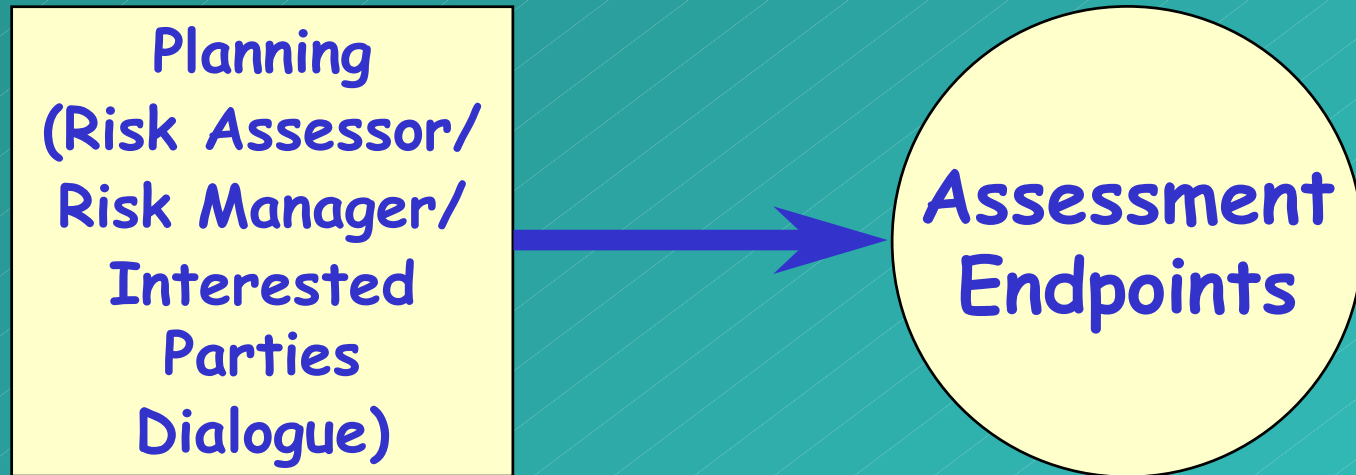
Responding to Mandates

- Trust species are but one assessment endpoint entity in site-specific risk assessments
- Resource Trustees are but one stakeholder - need to consider other management goals & stakeholder interests
- Use assessment planning process to identify appropriate endpoints

Planning Process



Planning Process



- Legal mandates & regulatory requirements
- Management goals
- Stakeholder interests & objectives

- subcellular
- organismal
- population
- community & ecosystem

As appropriate for the assessment